

Amendments to the Claims:

1. (Currently amended) An integrated fan pump comprising:
a housing for supporting the integrated fan pump, wherein the housing has a rectilinear configuration;

a fan coupled to the housing and having a fan head;

a fan propeller coupled to the fan head, wherein the fan propeller is selected from the group consisting of axial, tubeaxial, centrifugal, crossflow, backward-curved, forward-curved, airfoil, turbine, and straight radial;

a pump adapted to transfer a coolant from a coolant inlet to a coolant outlet, an external geometry of the pump adapted to be sufficiently compact such that gas flow through the fan and around the pump is substantially unimpeded by the pump, the gas flow moving from a gas flow inlet in a substantially straight, unchanged direction to a gas flow outlet, the pump having a pump head;

a pump impeller coupled to the pump head, wherein the pump impeller is selected from the group consisting of axial propeller blade, straight radial blade, centrifugal blade, backward-curved blade, forward-curved blade, and turbine blade;

~~a phase change device coupled to the pump;~~

an axle having a first axle segment coupled to the fan head and a second axle segment coupled to the pump head;

a mechanical gear coupled to the first axle segment and the second axle segment, wherein the mechanical gear is configured to rotate the first axle segment at a different rate than the second axle segment;

an expansion tank coupled to the pump;

a gas-release valve coupled to the expansion tank;

a liquid seal formed between the fan head and the pump head proximate to the axle, the liquid seal including a material selected from the group consisting of nitrile, polyacrylate, ethylene propylene, chloroprene, fluoro, silicone and butyl rubbers;

a heat source connected to the coolant outlet of the pump;

a heat exchanger coupled to the expansion tank, wherein the heat exchanger includes a plurality of disc-shaped fins and is coupled to the heat source, the heat exchanger using heat conduction and forced convection to transfer heat from the heat source to the coolant, and the heat exchanger is directly mounted to a surface of the fan; and

an electrical drive mechanism, wherein the electrical drive mechanism is a DC brushless motor and includes:

a first magnet coupled to the pump, the first magnet having a disc shape;

a second magnet coupled to the fan, the second magnet having a disc shape, wherein the first magnet and the second magnet are substantially collinear; and

a magnetic coil disposed between the first magnet and the second magnet, the magnetic coil having two solenoids, wherein the electrical drive mechanism is configured to simultaneously drive the fan and the pump, wherein the electrical drive mechanism has a rotational rate in the range of 2000 to 3000 rpm and the pump has a pump flow rate in the range of 5 cc/sec to 10 cc/sec and rotates the fan and the pump with respect to the housing.

2-33. (Cancelled)

34. (New) The apparatus of claim 1, wherein the fan propeller is an axial propeller and a size of the fan is selected from the group consisting of 20x20mm, 25x25mm, 30x30mm, 35x35mm, 40x40mm, 45x45mm, 50x50mm, 55x55mm, 60x60mm, 80x80mm, 92x92mm, 120x120mm, 6" diagonal, 8" diagonal, 10" diagonal, and 12" diagonal.

35. (New) The apparatus of claim 1, further including a low-friction sleeve bearing coupled to the axle.

36. (New) The apparatus of claim 1, wherein the housing includes a material selected from the group consisting of polypropylene (PP), acrylonitrile butadiene styrene (ABS), polyethylene (PE), and polybutylene terephthalate (PBT).

37. (New) The apparatus of claim 1, wherein the coolant includes a material selected from the group consisting of water, alcohol, antifreeze, and glycol.